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Development of a Popular Scientific Book about Sungkai Population Structure (*Peronema canescens* Jack.)

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Abstract

Science always follows changing times that have an impact on everyday life, including in the field of education. Therefore, education must be carried out effectively in order to create quality education and improve the quality of human resources. A quality education process requires the support of learning media. Based on the results of observations in the Plant Ecology course, the use of learning media is still lacking so students find it difficult to understand material about population structure. Popular Scientific Books (PSB) are a form of learning media that can be developed to solve existing problems. This research aims to determine the feasibility of a PSB regarding the population structure of Sungkai (*Peronema canescens* Jack.) in the Danau Sari Embun area, Tanah Laut Regency. The method used is the research and development method of the 5 phase PLOM model. The results of this research are based on the validity test of learning media which is in the very valid category and in the readability test the students received very good criteria. So it can be concluded that the learning media Popular Scientific Books can be used as a learning media.

Keyword: learning media; popular scientific books; population structure; Sungkai (*Peronema canescens* Jack.)

INTRODUCTION

Science always keeps up with changing times that have an impact on everyday life, including in the field of education. Education aims to prepare the younger generation to face changing times in the era of globalization. Therefore, education must be carried out effectively in order to create quality education and improve the quality of human resources. Quality education is education that is able to optimize students' potential and knowledge (Rasyid *et al.*, 2016; Nurfadillah *et al.*, 2021; Afifah *et al.*, 2022). A quality education process requires the support of learning media, which is all forms of material that helps lecturers/teachers/instructors in teaching and learning activities. Quality learning media are those that are able to facilitate the learning process, describe abstract concepts, encourage active student involvement, expand accessibility, increase learning motivation, and expand access (Rasyid *et al.*, 2016; Nurfitri *et al.*, 2022; Puspitasari *et al.*, 2023).

Developing a product to overcome learning problems must look at the background, characteristics and problems that occur in the environment. Based on the results of observations in the Plant Ecology course, the use of learning media is still lacking so students find it difficult to understand material about population structure. Students need learning media so that their learning motivation increases. Judging from the situation on the ground, universities and their surroundings have enormous local potential. This

potential is reflected in the high diversity of animal and plant species in the environment. This local potential can be used as an alternative solution to simplify the learning process by creating learning media. Popular Scientific Books (PSB) are a form of learning media that can be developed to solve existing problems. PSB is a book written in a way that is easy for the general public to understand and comprehend. Popular scientific writing uses simple, concise language, the text must be appropriate to the level of education, the ideas conveyed must be sequential, the sentences must lead to understanding, and the sentences used must be clear and convincing. Apart from that, PSB as a learning resource can be used to attract interest and attention. because its form is simple, contains information, is easy to remember and understand, and provides various views so it is not boring (Astuti *et al.*, 2021; Setiana *et al.*, 2022; Banna *et al.*, 2023).

PSB is suitable as a learning medium in plant ecology courses because PSB is a teaching medium that can be used in the learning process and a means of connecting information with the community. Not only Plant Ecology, it has also the same point with animal (Pertiwi & Lathifah, 2019; Ratih *et al.*, 2021; Triacha *et al.*, 2021; Fatonah *et al.*, 2023; Mufida *et al.*, 2023; Putri *et al.*, 2023). Popular scientific books are very useful for students, especially in increasing insight and knowledge about the material being studied, especially those based on local potential. The existence of popular scientific books with local potential really supports students in getting to know objects in their environment. Students will understand more deeply about material studies because the objects of study can be seen in everyday life (Irwandi *et al.*, 2019; Irianti & Mahrudin, 2021; Nurhana & Ita, 2023). Based on the description above, this research aims to determine the suitability of learning media for popular scientific books about the structure of the Sungkai population (*Peronema canescens* Jack.) in the learning process.

METHOD

This research is descriptive research using the Research and Development model Plomp method consisting of 5 stages, namely 1) preliminary investigation stage, 2) design stage, 3) realization or construction stage, 4) stage testing, evaluation and revision (test, evaluation and revision), and 5) implementation stage. The development stages can be seen in Figure 1.

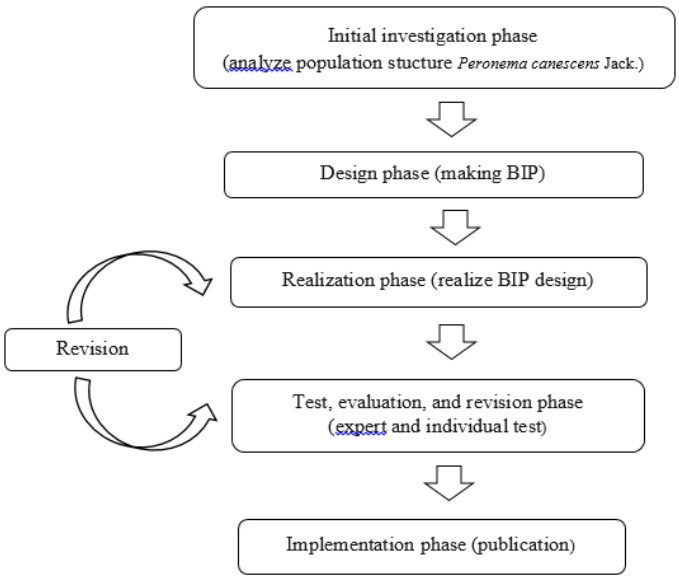

Figure 1. The development stages

The first stage carried out was an initial investigation by researchers collecting and analyzing information about the population structure of the Sungkai plant (*Peronema canescens* Jack.). Apart from

that, we also collected information regarding material needs for the RPS for the Plant Ecology course in the 2020 Curriculum Biology Education Study Program through a survey of 30 student respondents. Researchers also studied studies regarding techniques for making popular scientific books referring to the Ministry of Education and Culture (Kemendikbud) in 2020. The next step is to carry out field research, researchers will explore the entire area on the shores of Lake Sari Embun for material that will be included in the learning media. Then product creation begins in the second stage, namely design resilience, framework design which consists of compiling popular scientific book material where the content of this material includes lakes, population structure studies, sungkai population structure, benefits of sungkai plants, conservation and threats of sungkai plants. Then create a popular scientific book design, this design structure includes Title, Copyright, Foreword, Foreword, Table of Contents, List of Images, Telaga Sari Embun, Population Structure Study, Sungkai Population Structure, Benefits of Sungkai Plants, Conservation and Threats of Sungkai Plant Scarcity , Conclusion, Glossary, Bibliography, Author Biography, and Synopsis. This is followed by the realization stage, namely realizing the popular scientific book design plan that has been prepared previously, such as designing the cover, compiling the contents of the popular scientific book, compiling the popular scientific book, and printing the popular scientific book.

There are test, evaluation and revision stages, at this stage expert tests are carried out by 2 experts as validators consisting of 2 supervisors and individual tests are carried out by 3 students who have taken the Plant Ecology course. In the validation test by 2 validators and student readability tests, the development process was analyzed descriptively using relevant literature. Then the feasibility data in the form of product validity and readability test results, validity data of the popular scientific books being developed were analyzed by calculating the validity scores from the expert validation results of 2 experts. The known validity results were matched with the criteria (Dharmono *et al.*, 2022), then the readability data for popular scientific books was developed by calculating the scores of 3 students. The readability of students' responses to learning during individual tests is written descriptively based on the average score, and the readability results of the known content are adjusted to the criteria (Dharmono *et al.*, 2022). The final stage is the implementation stage, namely socializing the product on social media, one of which is Facebook, then the strategy for implementing this popular scientific book product is to the wider community and students.

RESULT AND DISCUSSION

In the initial stage, researchers conducted a survey via Google Form of 30 respondents to find out whether Popular Scientific Books were needed in the learning process. The survey results can be seen in table 1.

Table 1. User Survey Questionnaire Results

No.	Question	Answer	Percentage (%)
1.	Is the Population Structure material a difficult material?	Yes	96,7
		Not	3,3
2.	Do you have difficulty understanding the concept of population structure through the learning resources and methods used and applied by lecturers?	Very difficult	13,3
		difficult	76,7
		Less difficult	6,7
		It's not difficult	3,3
3..	What learning resources are used in understanding the concept of population structure through learning resources and methods used and applied by lecturers?	Textbooks	86,7
		Handouts	6,7
		leaflets	3,3
		Booklet	10
		Popular scientific books	3,3
		Module	10
		Pocket book	6,7
		Video	36,7
		Internet	80
		Plant Ecology guidebook	3,3
4.	Do you like interesting and colorful learning resources?	Ye	100
		Not	0
5.	Do the learning resources you have used provide information about the local potential of your area related to classroom learning materials?	Yes	48,3
		Not	56,7
6.	Do you need other learning resources in the form of popular scientific books to support the learning process and increase understanding of population structure material?	Absolutely necessary	40
		Necessary	60
		Less necessary	0
		No need	0
7.	Are you motivated to study population structure using popular scientific books as an additional learning resource?	Highly motivated	36,7
		Motivated	60
		Less motivated	3,3
		unmotivated	0
8.	Have you ever used popular scientific books learning resources in plant ecology course?	Very ever	0
		Ever	10
		Nervous	40
		Never	50
9.	If so, how many popular scientific books titles did you know when studying ecology?	1	78,6
		2	7,1
		3	7,1
		More than 3	7,1
10.	Is popular scientific books as a supporting material in the Plant Ecology course needed to increase understanding of material related to plant ecology?	Absolutely necessary	46,7
		Necessary	53,3
		Less necessary	0
		No need	0
11.	Do you agree if material related to population structure is developed using popular scientific books as a course material for plant ecology?	Totally agree	66,7
		Agree	33,3
		Disagree less	0
		Disagree	0

Based on table 1, it can be seen that PSB is still rarely used as a learning resource. Most students consider the Plant Ecology course with the topic of population structure to be difficult material, so students need learning media that can increase learning motivation. This is what causes course supporting teaching materials in the form of popular scientific books to need to be developed because many students need them to increase their learning motivation. The second step is to assess the RPS for the course by collecting information about material requirements for the RPS for the Plant Ecology course in the 2020 Curriculum Biology Education Study Program. Apply a religious attitude in solving problems in the scope of work that is creative, thorough, disciplined, responsible, adaptive and independent. Mastering the scientific fields of biological theoretical concepts, laboratory management, principles and application of statistics for research in the field of biology, mastering knowledge related to biological research methodology and learning, and being able to apply and publish the results, mastering knowledge related to biological research methodology and learning, and being able to apply and publish results, and have the ability to utilize information technology in studying, developing and applying knowledge according to their field of expertise with humanities values. Subject Learning Results and Sub-Course Learning Results are presented in table 2.

Table 2. Results from CPMK

No.	CPMK and sub-CPMK	Results
1.	Students are able to study the plant environment (CPMK)	Examining the environment for the growth of Sungkai (*Peronema canescens* Jack.)
2.	Able to examine the concept of the plant environment (CPMK)	Examining the environmental concept for the growth of Sungkai (*Peronema canescens* Jack.)
3.	Students are able to study plants from their environment (Sub-CPMK)	Examining Sungkai plants growing from their environment
4.	Students are able to study plant habitats (Sub-CPMK)	Examining the habitat of Sungkai plants
5.	Students are able to study the principles of plant populations (Sub-CPMK)	Principles of studying Sungkai plant populations
6.	Students are able to study plant population growth (Sub-CPMK)	Examining the growth of the Sungkai plant population
7.	Students are able to examine plant population analysis methods.	Examining methods for analyzing Sungkai plant populations

The results of the learning media for the Popular Scientific Book on Population Structure of the Sungkai (*Peronema canescens* Jack.) which had been created were validated by experts to determine the level of suitability of the media for the material on population structure in the Plant Ecology course. Input and advice from experts is very necessary to identify media deficiencies which can then be used as a reference for improving learning media (Marhamah, 2021; Putri *et al.*, 2021; Wini *et al.*, 2022). The learning media was validated by two experts, namely the supervisor and lecturer of the Plant Ecology course. The validation results can be seen in table 3.

Table 3. Results of scientific book validation by 2 validators

Indicators	Validators 1	Validators 2	Averege
I. Coherence Aspect			
A. Each paragraph in a populer science book has one main ide.	4	4	4
B. Connect between sentences using linkers.	3	3	3
C. Ideas are delivered sequentially.	4	4	4
D. The sentence has led the reader to understand the contects of the book.	4	4	4
Sum	15	15	15
Average		15	
II. Readability			
A. The content of the text is in accordance with the age level/level of education.	4	4	4
B. Sentences and many words can measure readership rates.	3	3	3
Sum	7	7	7
Average		7	
III. Vocabulary : expressions, work, choices, exaggeration			
A. Limited use of expressions is used.	4	4	4
B. The word or expression used does not use a lot of vocabulary.	4	3	3,5
Sum	8	7	7,5
Average		7,5	
VI. Active and passive voice			
A. Use active voice and passive voice.	4	4	4
Sum	4	4	4
Average		4	
V. Format			
A. In the form of scientific writing that displays evidence in the form of data or images that are compiled systematically	4	4	4
Sum	4	4	4
Average		4	
VI. Writing Method			
A. Simplicity and attractiveness of a piece of writing	3	3	3
Sum	3	3	3
Average		3	
VII. Application, implications			
A. Using real-world problems to attract readers	4	4	4
Sum	4	4	4
Average		4	
VIII. Definitions and explanations			
A. Use; descriptions, examples, analogies, and metaphors to facilitate reader understanding	3	4	3,5
Sum	3	4	3,5
Average		3,5	
IX. Other styles and devices: narrative, humor, analogy			
A. Using analogies to explain complex ideas	3	3	3
B. Using narration to explain the ideas presented	4	4	4
Sum	7	7	3,5
Average		5,83	
Total Average Validation Score		3,67	
Validation Criteria		**Very valid**	

Source: Data Processing result

Based on expert validation for aspects of coherence, readability, vocabulary, active and passive sentences, format, writing method, implementation and application, definition and explanation, and learning media style PSB received a total score of 50.83, then data analysis was carried out using the validity formula and obtained validity score is 3.67. If the learning media gets a score of 3.26 – 4.00 then it is included in the very valid category and does not require revision (Arikunto, 2016; Dharmono *et al*., 2022; Eliana *et al.*, 2022). The learning media for popular scientific books regarding the structure of the Sungkai population has the advantage that the material content is in the form of public knowledge about "Sungkai Population Structure (*Peronema canescens* Jack.)". The scope of the material not only describes the knowledge of the people in the Danau Sari Embun area about Sungkai, but is also equipped with relevant supporting and additional literature so that it can improve student learning outcomes (Fitriansyah *et al.*, 2018; Irwandi *et al*., 2019; Putri *et al.*, 2020).

The images used in the development of this Popular Science Book are original results from the field which can increase students' understanding of the content of the material and increase students' curiosity in learning (Bhandary, 2020; Fajrin *et al.*, 2021; Nurhana & Ita, 2023). Another advantage of the Popular Scientific Books developed which makes this teaching material practical is the presentation of Popular Scientific Books which are written simply and use a popular, simple and concise language style, so they are easy to understand not only for students but also lay people. And this popular scientific book has innovations such as in the appearance aspect, namely on the cover design there is an original image of a plant habitat, apart from that there is a picture of a lake area. The appearance of the cover design is expected to attract students' attention thereby increasing motivation and interest in studying the Plant Ecology course. Apart from expert validation, a readibility test is carried out to measure the level of difficulty of the PSB learning media. Apart from that, this test functions so that students can correct typos, unclear sentences, missing or unclear instructions, inappropriate examples, unfamiliar vocabulary, images or pages. Wrong and uncommunicative images. This test was carried out by 3 students who had completed the Plant Ecology course and received an A grade. The readability test results can be seen in table 4.

Table 4. Student Individual Test Result

No.	Assessed aspects	Responses		
		M1	**M2**	**M3**
1.	Every part studied is easy to understand.	4	4	4
2.	The entire contents of the complete BIP (Cover, editorial, introduction, preface, table of contents, list of images, main content, glossary, bibliography, author biography) .	4	4	3
3.	The words used are easy to understand.	4	4	4
4.	The image quality is good and understandable.	3	4	4
5.	Atypo or grammatical error not found.	3	3	3
6.	The photo on the cover is clear and understandable.	4	4	4
	Sum	22	23	22
	Validation Score (%)	91,67	95,83	91,67
	Average		93,05%	
	Readability Criteria		**Excellent**	

Source: Data Processing result

Based on the results of media data processing, PSB received an average score of 93.05% and was included in the very good criteria. PSB learning media is considered very good or useful. Apart from that, this PSB is in accordance with student characteristics so that it allows students to learn independently so that they can increase their learning independence. It is important to carry out individual tests so that the teaching materials developed are appropriate to the conditions of students

who will use them in the real field. The development of learning media that is prepared must be contextual, meaning it comes from the immediate environment and is familiar with everyday life. So student assessment of teaching materials needs to be done. A development product can be said to be practical if the product is easy for students or teachers to use and is richer than student learning books (Maryansyah, 2016; Imam *et al.*, 2018;Yulianto, 2019). The final product of the popular scientific book developed is of very good value, it has been improved according to suggestions from two validators and 3 students, so that the learning media of the popular scientific book can be used as a learning medium in the teaching and learning process. Practical learning media is learning media that can produce useful and student-focused learning through the use of appropriate procedures, its implementation is carried out correctly, according to learning objectives, and doing other creative things for students (Muhammad, 2016; Astuti *et al.*, 2021; Noorannisa *et al.*, 2022). This thing will be beneficial to human like this research product too (Istiana *et al.*, 2019; Saputri *et al.*, 2020; Pertiwi & Saputri, 2020; Saputri & Pertiwi, 2021).

CONCLUSION

Based on the results of research on the development of the Popular Scientific Book on Population Structure of Sungkai (*Peronema canescens* Jack.) in the Danau Sari Embun Area, Tanah Laut Regency as supporting material for the Plant Ecology course on the Topic of Population Structure, it has a validity score of 3.67 with very valid criteria and has a score Student readability was 93.05% with very good criteria. This learning media has the advantage of being material in the form of public knowledge which is complemented by relevant literature, original images obtained from the field, written simply, using popular language, and concisely. So it can be concluded that the learning media for the Popular Scientific Book Sungkai Population Structure can be used as a learning media in the teaching and learning process to increase student motivation. This research is useful for the national community, especially teachers, because this research can be used as a reference or literature in creating learning media.

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